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This handbook explains planned preventive maintenance program, which is an operational system of maintenance designed to increase the effectiveness of the maintenance staff and the use of maintenance funds through efficient scheduling of inspections and follow-through of work to be performed. Sections are included for the chief administrative officer, the chief business officer and for the supervisor of maintenance suggesting systems and procedures for the implementation of such a program. Other sections cover the specifics of the plan and suggestions for putting the program into full or partial operation. (FS)

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A PLANNED
PREVENTIVE MAINTENANCE
PROGRAM

EF003358

The University of the State of New York
The State Education Department
Office of Administrative Services in Higher Education
Albany, New York 12224
1966

A PLANNED PREVENTIVE MAINTENANCE PROGRAM

A Handbook
for
Chief Business Officers
and
Supervisors of Maintenance
with
Suggestions on Maintenance for Consideration
by Presidents of Higher Institutions

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Prepared for

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New York State
Education Department

1966

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THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
ALBANY, NEW YORK 12224

FRANK R. KILLE
ASSOCIATE COMMISSIONER

September 1966

MEMO TO: Chief Executive Officers in Higher Education

SUBJECT: Preventive Maintenance Manual

One of the major costs of higher education is that of maintaining and operating the physical plants of colleges and universities. As enrollments grow and new buildings are added, the need to protect adequately and to care for this huge investment in facilities becomes increasingly important.

To help accomplish these objectives, it is considered essential that a well designed program of preventive maintenance be developed and conducted on each college campus. Breakdowns of equipment, service, and closing of buildings for major repairs can disrupt the academic and administrative programs, as well as resulting in substantial financial costs to correct these situations.

To prepare a manual that could outline a workable plan for an effective preventive maintenance program, Irwin K. French, Director of our Office of Administrative Services in Higher Education, engaged the services of Clarence H. Daniel, Vice President and Business Manager of Rensselaer Polytechnic Institute.

We are pleased to provide you with a copy which you may wish to consult should you consider the establishment of a program along the lines described in this manual.

Sincerely yours,

Frank R. Kille

Frank R. Kille

FOREWORD

The purpose of this handbook is to help institutions of higher learning implement procedures that will lead to good maintenance practices. It is not intended that this handbook be a maintenance instruction book or a janitor's manual.

Many books, magazine articles and advertising pamphlets concerning actual maintenance practices are already available to personnel engaged in maintenance and repair work. In addition, conferences, meetings, and workshops are held each year which present to maintenance and operation staffs the latest maintenance techniques, practices and procedures. Therefore, this handbook assumes that maintenance personnel are knowledgeable about the maintenance information available through various media and can make reference to it.

This handbook explains a Planned Preventive Maintenance Program so that administrators will have the opportunity to recognize its value and be persuaded to encourage, influence, request or demand that supervisors of maintenance install the plan. Sections are included for the chief administrative officer, the chief business officer and for the supervisor of maintenance, suggesting systems and procedures for the implementation of a Planned Preventive Maintenance Program. Other sections cover the specifics of the plan and suggestions for putting the program into full or partial operation.

A further purpose of this handbook is to help establish a maintenance program which will be understood by faculty and staff. Faculty, administrative, and staff personnel of a college or university are often very critical of maintenance and repair operations. Such criticism stems from the fact that all persons are in some way responsible for the maintenance of a home, car, furniture, clothing, and similar items, for which they set personal standards of upkeep. Further, persons are inclined to comment about the quality of maintenance because it affects four of the five senses; namely, seeing, feeling, hearing, and smelling. Occupants of a building can recognize inadequate maintenance by seeing a poor painting job, careless carpentry work or housekeeping, as well as by feeling unfinished work, by smelling odors caused by poor ventilation or hearing squeaks or rumbles from operation of equipment. Although maintenance personnel have a difficult time of satisfying each and every faculty, administrative and staff member, the Planned Preventive Maintenance procedure performed according to pre-determined schedules will assist in improving the maintenance program and reducing the number of complaints.

It is expected that the costs of operating and maintaining colleges and universities will double in the next ten years. As a result, college administrators will be forced to examine operating budgets carefully to determine whether or not they can be reduced without impairing the effective performance of required functions.

In the future, budgets for all non-academic departments, and especially maintenance, must be prepared with special care. Physical plant operation and maintenance programs, therefore, must be carefully examined to determine whether or not programs can be developed to accomplish better maintenance and operation results at a lower cost. A good, well-planned Preventive Maintenance Program is one step that maintenance and operation departments can take to reduce the over-all operating costs of an institution.

To make certain that everyone is thinking and speaking the same language in the following sections of this handbook a Planned Preventive Maintenance Program may be defined as follows: It is an operational system of maintenance, designed to increase the effectiveness of the maintenance staff and the use of maintenance funds through efficient scheduling of inspections and follow-through of work to be performed.

I wish to express my appreciation to Mr. Irwin K. French, Director, Office of Administrative Services in Higher Education for assistance provided in the preparation of this handbook.

Recognition should also be extended to the staff of the four schools who actively participated in testing and setting up a Planned Preventive Maintenance Program. These colleges are St. Francis College, Polytechnic Institute of Brooklyn, Cooper Union and Fashion Institute of Technology.

MEMORANDUM TO THE PRESIDENT

MEMORANDUM

To: The President

Subject: A Planned Preventive Maintenance Program

All college and university administrators are engaged in a battle against rising costs. It is probable that the effectiveness and costs of maintenance programs are questioned too frequently, and that satisfactory and definitive answers are too seldom forthcoming.

It is the intent of this handbook to provide both a framework for answering these questions and a "nuts and bolts" approach to solving today's maintenance problems.

The increasing size of colleges and universities brings increased difficulties in the operation of a maintenance program, such as:

1. Poorer staff co-ordination,
2. Less follow-through resulting in higher costs,
3. More dissatisfaction because of the lack of personal attention,
4. Higher costs with less control,
5. Greater need for clear statements of objectives, new policies and procedures, and careful preparation of long-range facility planning.

In spite of the difficulties, maintenance of the physical plant is a _must_. Since it is becoming more costly each year, it is becoming questioned more severely as to costs, procedures, and results. However, cutting maintenance and repair costs without a well-planned maintenance program may result in failures that could:

1. Affect the quality of education,
2. Interfere with the teaching process,
3. Reduce the value of capital invested, and
4. Endanger the health and safety of faculty, staff and employees.

Cost controls can be established, and it is important to establish them as soon as possible.

What Planned Preventive Maintenance Can Do for Your Institution

As stated in the Foreword, a Planned Preventive Maintenance Program is an operational system of maintenance designed to increase the effectiveness of the maintenance staff and the use of maintenance funds through efficient scheduling of inspections and follow-through of work. A Planned Preventive Maintenance Program can reduce costs of maintenance and physical plant operation and at the same time provide many other benefits to a college or university (See Exhibit I). Some institutions that have established Planned Preventive Maintenance Programs have publicly stated that they have reduced maintenance costs 20% - 35% along with many other tangible and intangible benefits.

Some of the more important benefits are included in the following list:

1. Building maintenance and repair costs can be reduced by

scheduled inspections and timely repairs made to roofs, exteriors, interior walls, ceilings and floors, grounds, operating equipment, and mechanical and electrical services.

2. Buildings and Grounds administrators can justify their budget requests and can indicate in more detail their goals and objectives.
3. A Planned Preventive Maintenance Program can increase the confidence and morale of the maintenance organization while at the same time promoting mutual respect and cooperation between academic and other non-academic departments.
4. Work which has been scheduled can be followed through to completion, resulting in lower costs to complete the work.
5. Costs can be ascertained for future manpower and budget requests.
6. Capital funds which are needed to replace or repair buildings, components or equipment will be reduced after the program has been in effect for a few years, (See Exhibit II).

Other benefits of a Planned Preventive Maintenance Program include: (1) reduction in number of safety hazards, (2) lower inventory costs, (3) better spare parts inventory control, (4) proper maintenance or equipment, (5) reduction in the number of physical plant failures calling for emergency

EXHIBIT I

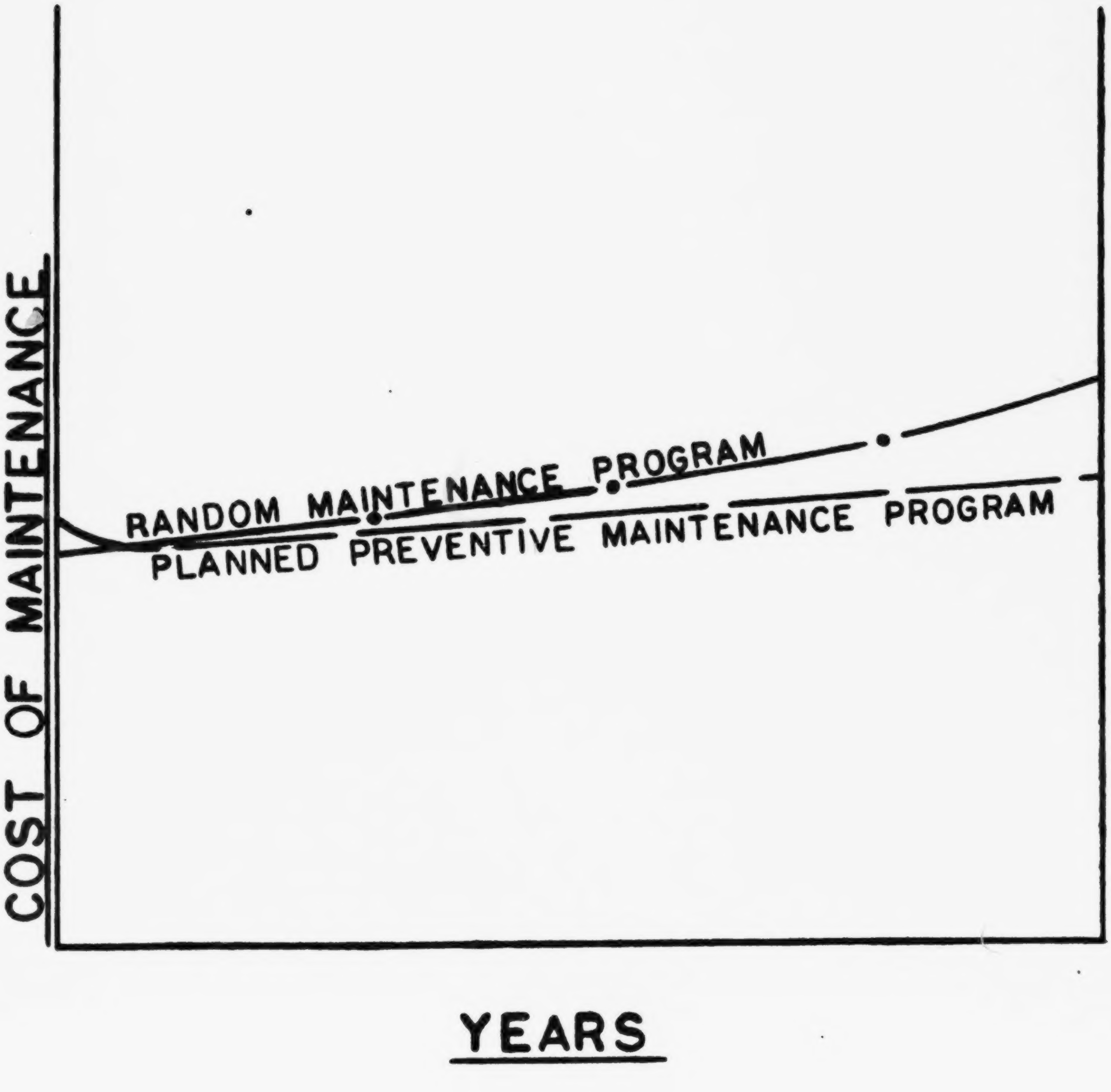
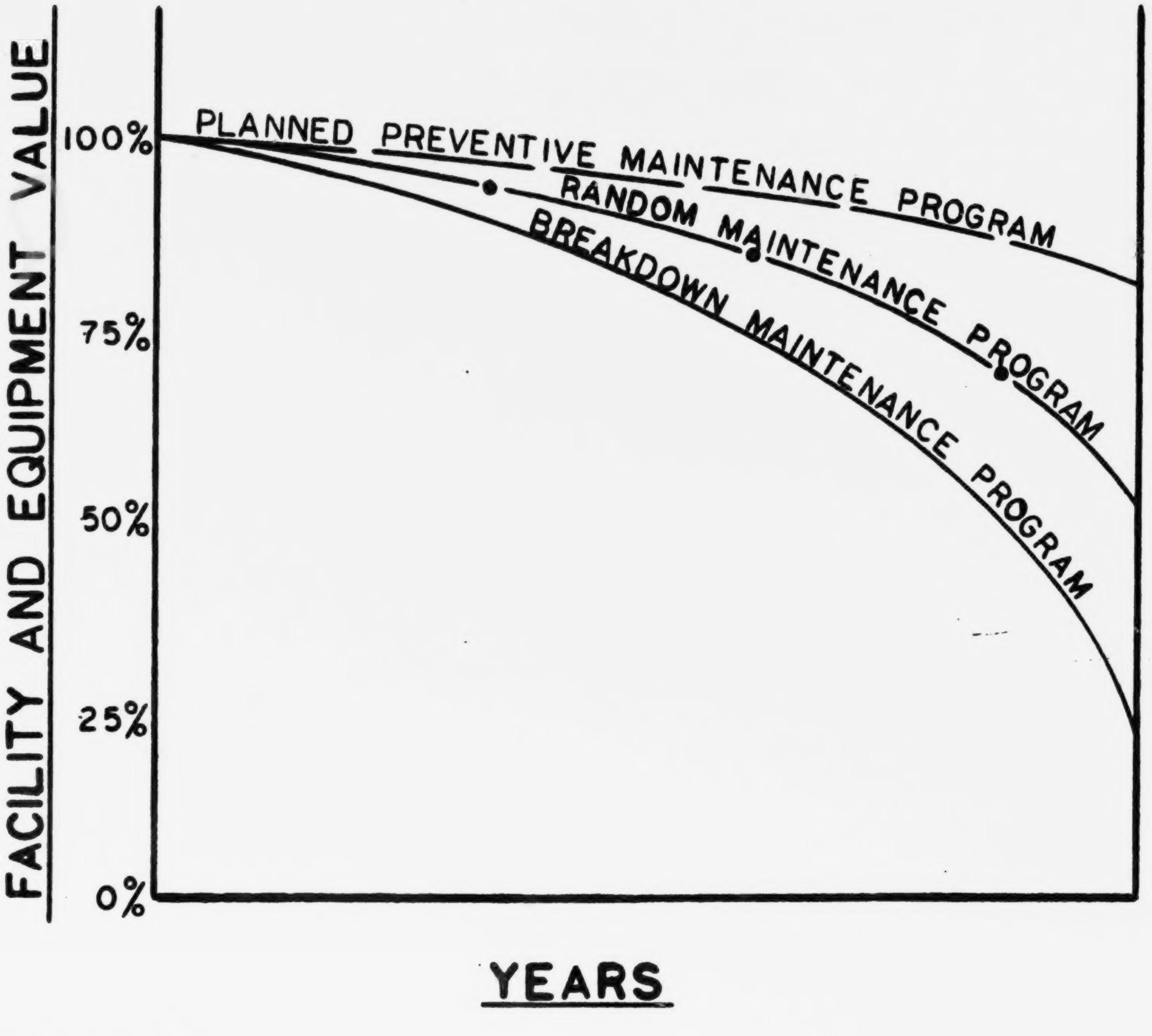

COST OF MAINTENANCE
RANDOM MAINTENANCE PROGRAM
PLANNED PREVENTIVE MAINTENANCE PROGRAM
YEARS

EXHIBIT II


FACILITY AND EQUIPMENT VALUE
100%
75%
50%
25%
0%
PLANNED PREVENTIVE MAINTENANCE PROGRAM
RANDOM MAINTENANCE PROGRAM
BREAKDOWN MAINTENANCE PROGRAM
YEARS

action, (6) more evenly distributed maintenance work load with a better quality of workmanship, and (7) more effective use of facilities and equipment.

It must be understood that regardless of how good a Planned Preventive Maintenance Program may be, emergency breakdowns cannot be completely eliminated. A good program of Planned Preventive Maintenance can, however, greatly reduce these occurrences.

Planned Preventive Maintenance and Size of Institution

Any school or university, regardless of the size of its maintenance staff, can put a Planned Preventive Maintenance Program into effect. A small urban or country college can install the system with as few as three employees. In this instance the program may be of a minimum type. This, however, does not detract from the effectiveness of the program.

Action Steps to be Taken

1. Request that the chief business officer examine the need for a Planned Preventive Maintenance Program for your college or university. Most buildings and grounds departments are already employing some of the policies, procedures and techniques usually associated with a Preventive Maintenance Program. However, investigation of such systems usually

indicates that these programs are partial and restricted to limited areas. They are often impromptu programs and need formalizing before they attain their maximum usefulness.

2. If the need for a Planned Preventive Maintenance Program exists, it is suggested that the chief business officer be responsible for initiating the program. The responsibility for implementing a Planned Preventive Maintenance Program lies directly with this individual since maintenance is usually assigned as a function of his office.
3. Request status reports periodically to ascertain the progress being made.

Conclusion

A Planned Preventive Maintenance Program has many tangible benefits in its favor. However, initially it may require special attention such as:

1. Additional funds to set up the program initially.
2. A revision in certain existing objectives, policies and procedures.
3. Cause internal administrative problems with an uninformed staff.

However, experience has shown that:

1. A Planned Preventive Maintenance Program can be set up by a small college or large university, and

2. It will offer improved maintenance and repair, resulting in a lower cost of operation, a better understanding of costs, defined policies and procedures, and higher morale among all persons interested in or associated with maintenance.

CHIEF BUSINESS OFFICER'S SECTION

THE MANAGEMENT OF MAINTENANCE

What is Maintenance?

Webster's Dictionary states that "maintenance" is "the upkeep of property, equipment, etc." Maintenance is, therefore, that work necessary to protect the investment in buildings and equipment.

There are many types of maintenance programs the more common types of which are:

Crash or Breakdown Maintenance - sometimes termed Critical Maintenance - is maintenance which is directed at repairing the building or equipment when a failure takes place. Crash or Breakdown Maintenance is performed under conditions which require hurried decisions. When repairs are made under these conditions, they may have to be made again at a later date. This type of maintenance is the most expensive.

Corrective Maintenance is work performed on buildings or equipment to correct a malfunction due to poor design. The defect can be corrected by redesign, by use of new materials, or by rebuilding or renovation.

Random Maintenance is maintenance which is performed because the need for repairs becomes obvious to the user of the facility or equipment. This kind of maintenance is sometimes erroneously called preventive because the work is generally performed in advance of a breakdown.

Non-routine Maintenance or Selective Maintenance is that maintenance which normally is done as work outside of a Planned Preventive Maintenance Program. This work is usually such that if failure occurs it will have no major effect on the operation of the college or university.

Routine Maintenance is that maintenance which is performed on a recurring or repetitive basis. A Planned Preventive Maintenance Program works particularly well under such conditions.

Planned Preventive Maintenance, with which this handbook is concerned is based upon systematic inspections and planned work, the system being so designed as to increase the effectiveness of the maintenance staff and the use of maintenance funds through efficient scheduling of inspections and follow-through of work to be performed.

"Instant" Maintenance - A Fiction A snap of the fingers, an administrative order, or a push of a button cannot result in "instant" maintenance.

Skilled manpower, good materials and excellent leadership on an individual maintenance problem may produce the desired results for a crash program or for a short period of time, but this method of operation will not bring an institution of higher learning "instant" maintenance. "Crash" maintenance programs cost money and interfere with regularly scheduled maintenance programs.

A Planned Preventive Maintenance Program will not provide "instant" maintenance but it will reduce the number of "Crash" maintenance or repair projects, and it will increase the effectiveness of the maintenance dollar.

For years, individuals have recognized the personal value of preventive maintenance when they insist that teeth be brushed at least daily, that a balanced diet be eaten to prevent illness, or that annual visits be made to their dentists and doctors. In the case of automobiles, most family and business cars are voluntarily lubricated on a scheduled basis, repaired before breakdown, and equipped with new tires before failure occurs. Car manufacturers have recently provided a 50, 000 mile warranty based on compulsory Planned Preventive Maintenance Program under which failure to follow the specified service requirements results in the warranty being voided.

Homeowners usually apply the principles of Planned Preventive Maintenance to their home, furniture, and mechanical or electrical equipment, because a failure would affect their personal comfort. They try to avoid emergency repairs because they are costly, inconvenient, and troublesome. If there were an "instant" maintenance program available, homeowners would be the first to make use of it.

It can be concluded, therefore, that maintenance must be planned, scheduled, performed and followed through to completion to accomplish the desired results. "Instant" maintenance is a fiction.

Need for a Planned Preventive Maintenance Program

The implementation of a Planned Preventive Maintenance Program can, for the most part, help to alleviate the maintenance problems because of the following features:

1. By proper inspection procedures, funds can be directed to the area where the most good will be done. If problems are discovered while they are "small" they will usually cost less to repair than if they are allowed to become an "emergency".
2. Through proper work scheduling, based on information gained through planned inspection procedures, the efforts of the maintenance staff can be guided and controlled. Misdirected and wasted effort can be in large part eliminated.
3. By providing the maintenance staff with a definite checklist, a high percentage of the guesswork of inspection is eliminated. With the checklist as a guide, the inspector does not have to qualify - for example - as a "master plumber" to perform a complete inspection.

The value of a Planned Preventive Maintenance Program lies in its ability to provide an orderly program of operations.

Unfortunately, many administrators believe that a "Crash" Maintenance program is the least expensive form of maintenance in all but a few specialized areas such as the boiler houses and elevators. The savings indicated are often false savings inasmuch as the repairs made on an emergency basis are usually "makeshift repairs" which must later be corrected. This procedure is expensive and can be largely eliminated through a Planned

Preventive Maintenance Program.

Many colleges and university administrators also believe that the inspection procedure which is part of the Planned Preventive Maintenance Program is already performed through fire, safety and other insurance inspections. In reality, while such inspections are very important, they are only a small part of a good preventive maintenance program. Whether performed by a company representative or an internal staff of men, such inspections are usually very special in nature and are only as good as the inspector's abilities and sincerity to perform a qualified inspection.

Finally, the totally dedicated maintenance and repair man is fast disappearing from the campus environment. The loyal employee who once worked unlimited hours without concern for time or energy expended is being replaced by one who believes that fringe and employee benefits are more important than getting the work done properly. It is necessary, therefore, to prepare a program in which protection for the buildings and equipment is built into the system. To cover the necessary maintenance and repairs to buildings and equipment, a Planned Preventive Maintenance Program must be started and then followed through.

Benefits of a Planned Preventive Maintenance Program

Colleges and universities will experience many realistic benefits from a Planned Preventive Maintenance Program. Some of the more important benefits to be gained are included in the following list:

1. Building maintenance can be reduced by timely repairs to roofs, exteriors, interior walls, ceiling and floors.
2. Equipment breakdowns can be reduced by scheduled inspections.
3. A Preventive Maintenance Program properly set up and explained to faculty, staff and administrators, will result in its better understanding.
4. Improved budget analysis resulting from the program will enable administrators to understand more thoroughly the requests for funds.
5. Improved follow-through of work to be done and better results from a cost and production standpoint will be achieved.
6. Safety hazards will be reduced.
7. Inventory costs will be lower and at the same time spare parts protection will be improved.
8. Capital funds needed to replace or repair buildings, components or equipment will be reduced.
9. Mechanical and electrical equipment will be properly lubricated.
10. Inspections will enable administrators to plan and schedule work, a procedure that will result in lower costs to perform and complete the work.

SUPERVISOR'S SECTION

REVIEW OF PLANNED PREVENTIVE MAINTENANCE AS A FUNCTION OF PHYSICAL PLANT OPERATION

The previous section covers the responsibilities of the chief business officer in setting up a Planned Preventive Maintenance Program. This section is directed to the individual who is in charge of maintenance and repair of buildings and grounds. However, to insure continuity in the handbook, the main points of the preceding sections are now summarized. This review, plus the observations in the Foreword, should provide a comprehensive picture of how Planned Preventive Maintenance is related to the physical operation of a college or university.

Policies and Procedures

Each college and university should have goals and objectives which are complemented by policies and procedures designed to insure the accomplishing of these goals. If such policies and procedures are not clearly defined to the maintenance administrative staff, they should be reduced to writing so that all will have an opportunity to review and familiarize themselves with them. A Planned Preventive Maintenance Program should be included as one of the procedures most important in accomplishing the goals and objectives of an effective maintenance program.

Responsibilities and Authority

It is generally recognized that the maintenance of buildings and grounds is one of the major responsibilities of a chief business officer. He, therefore, must work with maintenance personnel to establish budgets, approve expenditures, recommend changes in maintenance and operation procedures, approve personnel employment and assist with other similar operational details. It is his responsibility to assist in setting up a Planned Preventive Maintenance Program. He has the authority to assist in planning the program, putting it into action, and for following through with the program. However, the responsibility for the daily operation of the program must rest with the supervisor of maintenance.

Organization

In order to put a Planned Preventive Maintenance Program into operation, it is necessary to define the responsibilities of all who will be connected with the program. The organizational set-up should be put into writing complete with job descriptions and an organization chart.

Staffing and Training

Certain colleges and universities may find that there is no person to whom the responsibility of following a Planned Preventive Maintenance Program can be assigned. This is usually found on campuses which are in a large expansion building program, and which have not staffed the buildings and grounds department to handle the increased load.

If there is no person available, perhaps the areas of responsibility could be assigned among the foremen or men of specialized talent in a particular field. This will present problems of co-ordination.

Accounting and Budgetary Procedures

The implementation of a Preventive Maintenance Program does not usually require additional funds to put the plan into operation. However, large operations may require an additional staff man to provide the necessary continuity to the program. If the program being installed is one of the more sophisticated, additional staff services will be required to handle the details.

If cost records of operating a Preventive Maintenance Program are required as an administrative request, the accounting department can assist in establishing a proper accounting procedure. It should be recognized that the increased demand for detailed cost records will cause an increase in the record keeping function. Although many benefits of a Planned Prevenitve Maintenance Program which serves all faculty, staff and students may not always be measured in the form of cost savings. The value of a program will be demonstrated by the saving in overall budget expenditures.

Performance Review and Evaluation

Every program at a college or university is measured to some degree in terms of dollars. A Planned Preventive Maintenance Program can be measured in terms of dollars saved, but such an approach does not really measure the total value of the program. No scale has been derived to measure the increased morale of the maintenance staff due to a Planned Preventive Maintenance Program, and no value can be assigned to increased confidence in the maintenance program on the part of faculty, staff or students.

It is important, however, that a summary of the benefits of the program be submitted periodically, indicating not only the cost savings but also other less tangible yet important benefits.

Value of Planned Preventive Maintenance to Supervisors

Supervisors of maintenance in colleges and universities have been trying for years to impress the administrative officers with the importance of maintenance. A Planned Preventive Maintenance Program will help to attain this objective.

Specifically, while the program will basically serve three purposes (protection of capital investment, keeping the college facility operating at a high level of performance and lowering of operational costs), it will also benefit the supervision of maintenance in many other ways. For examples, it will:

1. Assist in budgeting, evaluating and controlling actual expenditures,
2. Enable better evaluation of the performance of the maintenance staff,
3. Permit better control of maintenance goals and objectives,
4. Assure the preparation of reports which are timely and of assistance in establishing work order reports priority,
5. Eliminate work order delays through improved scheduling and help to maintain control over back orders,
6. Help to instruct and train foremen and maintenance personnel,
7. Improve material control,
8. Help in effective scheduling of manpower,
9. Assist in determining methods or procedures to perform work,
10. Permit record keeping on non-routine work which would become routine work under a Preventive Maintenance Program, and
11. Eliminate duplicate requests for work.

Other important advantages of the program are:

1. All academic and non-academic personnel will appreciate the improved service provided through this plan.
2. The "satisfaction" of a maintenance man as a result of a "job well done" will increase. The frustrations which ordinarily accompany maintenance work will be reduced.

3. Labor relations will be improved as all maintenance personnel will have a better understanding of work requirements and accomplishments.

Responsibilities of a Preventive Maintenance Man

The supervisor of maintenance should be certain that the man assigned to a Planned Preventive Maintenance Program is qualified to perform the inspection work and can follow the needed repair work through to its conclusion. He should be fully acquainted with the areas assigned to him. The man appointed to do this work must be able to work with the maintenance staff and must be respected for his abilities. He must understand maintenance goals, and the policies and procedures to accomplish these. He must be able to communicate his thoughts and ideas to his supervisor and the maintenance staff.

More specifically, a man assigned to a Planned Preventive Maintenance Program whether by area, zone, or specific trade should:

1. Be fully informed about his area of responsibility.
2. Be capable of assuming responsibility for informing his supervisor of needed repairs.
3. Be responsible for seeing that work requested is followed through to completion.
4. Be responsible for making suggestions, comments, or corrections on previously assigned work.

5. Be capable of making recommendations with respect to improving techniques, for example, in matters related to inspections or to the purchasing of new material or machines.
6. Be able to accept comments or complaints on his activities and to take constructive action toward improvement.
7. Be capable of assuming responsibility for preparing necessary records. (Usually a maintenance man does not understand the need for records nor does he care to submit the necessary records. If he decides that records should not be submitted, the system will fail.)
8. Be willing to follow the established safety rules and insist that those under his jurisdiction follow these rules.
9. Understand that he must accept orders only through authorized channels and not try to satisfy individual requests as a personal favor.
10. Not attempt to make corrective repairs on equipment, or to facilities with which he is not familiar.
11. Be courteous and helpful to all persons with whom he is working. Many problems of a maintenance staff are incurred needlessly because of failure to cooperate or understand other's problems or feelings.

INITIATING A PLANNED PREVENTIVE MAINTENANCE PROGRAM

Certain basic steps must be taken to install any one of the Planned Preventive Maintenance Programs - simplified system, standard system, or sophisticated system.

"Selling" the Program to Maintenance Personnel

The first, and the most important, step in the implementation of a Planned Preventive Maintenance Program is "selling" the key maintenance personnel on the necessity, advantages, and benefits of the program. The complete understanding and co-operation on the part of these individuals is fundamental to the successful development of this program. Necessary to this understanding is a discussion of the role of the buildings and grounds organization, the policies of the college or university with respect to the standards of maintenance required, the procedures of the program, and the goals to be accomplished.

Training Session

The success of a Planned Preventive Maintenance Program also depends upon the ability of the physical plant supervisory staff to communicate the requirements of the program to the maintenance men. The procedures and the reasons for these procedures must be fully detailed to all maintenance personnel. Training sessions, either formal or informal, must be set up so that the entire scope of the program is made known to all participants. Whether this is done individually or in groups is a decision which must be made by the supervisor. It is up to him to choose the approach which will best get the program across to his employees.

In the course of this training each participant in the Planned Preventive Maintenance Program should be informed of the role he will play in the overall maintenance operation. He should be assigned definite duties and should be informed as to his responsibility and authority in carrying out these duties.

It is imperative that a communications channel be set up to enable all participants in the program to discuss or suggest improvements in the plan. It is equally imperative that this channel - once established - be kept open. Any procedure which serves to effectively block communications between members of the maintenance staff can completely destroy even the best of programs. Therefore, it should be possible for all men involved in the Planned Preventive Maintenance Program to personally comment, suggest or criticize the procedures. This direct approach will encourage co-operation and give each man a feeling that he is helping the program become an effective one.

In general, the training program should cover the following:

1. What is Planned Preventive Maintenance,
2. The need for a Planned Preventive Maintenance Program,

3. The benefits of installing the program,
4. The goals and objectives to be attained by the implementation of a Planned Preventive Maintenance Program,
5. The type of system to be installed, and
6. The responsibilities of the staff.

Further discussion could center around such operational procedures as:

1. Putting the program of the type selected into operation.
2. Scheduling of inspections on a daily, weekly, monthly, and long-range basis -
    - A. Buildings, interior and exterior
    - B. Equipment, mechanical and electrical
    - C. Grounds.
3. Planning and scheduling of work required to be done.
4. Authorizing work to be done.
5. Determining priorities.
6. Work progress reports.
7. Cost controls and reports.
8. Planning future work and inspection.

Review of Policies and Procedures

The policies and procedures of the maintenance department should be examined to determine whether or not they complement or conflict with the Planned Preventive Maintenance Program to be initiated. The organization of the buildings and grounds department may have to be changed to set up areas of responsibilities which will enable the Planned Preventive Maintenance Program to be implemented

An examination of the work order procedure may have to be reviewed since complete records are necessary to the Planned Preventive Maintenance Program. Informal, verbal, or "scrap paper" work orders are insufficient. Also since budget requests can be documented by the records made available through a Planned Preventive Maintenance Program, a change in budget procedures may be necessary.

Stock items included on the inventory may have to be checked and new procedures established for inventory control and the requisitioning and accounting for items requested by maintenance men.

An examination of all records systems maintained should be made. As colleges and universities grow larger, it will be necessary to have this information for control purposes, budget preparation, historical data, and various analysis. The records designed as part of a Planned Preventive Maintenance Program are used to supplement the inspection and are designed to take the place of the maintenance man's memory.

Many procedures and policies which often appear to be minor or insignificant in scope can be changed to assist the operation and the maintenance of the facilities and equipment.

Initial Inspection

The first operational step in a Planned Preventive Maintenance Program is a detailed inspection of buildings and equipment. For all systems, inspection forms have been designed. Certain forms are included in later sections to illustrate the inspection and reporting procedures.

It is recommended that the first inspection be made by the physical plant manager together with other appropriate staff so that specific recommendations can be made using the forms suggested. A casual examination or verbal report does not fulfill the requirement that complete records be kept of all inspections. Since the forms provided are only guides, it is reasonable to expect that the physical plant manager will find areas, facilities or equipment which are not covered. Inspection sheets for these should be added at the start of the Planned Preventive Maintenance Program. This initial inspection, therefore, must be complete - it determines the areas of interest which will be a continuing part of the program.

Rescheduling Inspections

In order to provide continuity of inspections, a master schedule should be set up to insure timely re-inspections. Information for this can be, in the case of mechanical equipment, evolved from manufacturers' handbooks and similar material. For buildings, this information can best be determined by a review and analysis of the results of the initial inspection and from past experience. A typical master schedule form designed for building interiors will be found in a following section.

SYSTEMS OF PLANNED PREVENTIVE MAINTENANCE PROGRAMS

Three systems of Planned Preventive Maintenance Programs have been designed for consideration by physical plant administrators. These systems are identical in their goals. They differ only in the degree of sophistication and thoroughness of the procedures used to reach these goals. The three systems are: (1) Simplified, (2) Standard, and (3) Sophisticated.

The Simplified program is designed for use by colleges with a maintenance staff of fewer than 20-25 employees. It can also be used, however, by larger institutions which do not wish to establish one of the more complex systems. A Simple Preventive Maintenance Program is easy to set up and involves an informal system of planning and scheduling and a minimum of reports and paper work. However, the end result will produce less savings than the other two plans and only a few of the many benefits of Planned Preventive Maintenance will be achieved. Examples of the forms used for the Simplified system are attached as Exhibits III and IV.

The Standard system can be used by most college or university maintenance departments. Generally it is designed for maintenance staffs with 25 or more employees. This system provides formal planning and scheduling, an informal job costing system, and a planned work order system. This system can easily be expanded into the Sophisticated program. Examples of the forms used for a Standard system are attached as Exhibits V and VI.

Building No.

Floor

SIMPLIFIED
PLANNED PREVENTIVE MAINTENANCE PROGRAM

Interior
Rooms or Area Inspection

Date of Inspection ________________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Ceiling 1	Walls 2	Floors 3	Trim 4	Cove Base 5	Doors 6	Windows 7	Partitions 8	Fixed Furniture 9	Shades, blinds, drapes 10	Chalkboard 11	Bulletin Board 12	Lights & Fixtures 13	Radiators 14	Ventilation 15	Air conditioning 16	Sinks-washbasin 17	Floor drains 18	Sprinklers 19	Showers 20	Electrical outlet 21	Exposed-wiring piping 22	Exhaust hoods 23	Thermostats 24	Filters 25	Electrical switch 26	Steps - stairs 27	Platforms-stage 28	Closets 29	Partition-moveable 30	31	32

Exhibit III

PREVENTIVE MAINTENANCE PROGRAM

Rooms or Area ________ Date

Item #____ R or A ____ needs the following attention:

____

____

____

Item #____ R or A ____ needs the following attention:

____

____

____

Item #____ R or A ____ needs the following attention:

____

____

____

Item #____ R or A ____ needs the following attention:

____

____

____

Estimated Cost to do the Work:

Item____ R or A____ Budget or Fund Account No. __________ $____________
Item____ R or A____ Budget or Fund Account No. __________ $____________
Item____ R or A____ Budget or Fund Account No. __________ $____________
Item____ R or A____ Budget or Fund Account No. __________ $____________
Total Estimated Cost $____________

Actual Cost: Date Completed ________
Item____ R or A____ $__________
Item____ R or A____ $__________
Item____ R or A____ $__________
Item____ R or A____ $__________

Total Cost ____________

Exhibit IV

SIMPLIFIED
PLANNED PREVENTIVE MAINTENANCE PROGRAM
ROOF AND EXTERIOR INSPECTION

Seasonal Inspection

November - March - June - August

Building____________________

Date of Inspection___________

Check column if the maintenance is satisfactory.
If repairs are needed put (r) in column and explain on the back of this sheet.

Areas	1 Roof deck	2 Roof material	3 Flashing	4 Roof drains	5 Metal work	6 Projections	7 Leaders & gutters	8 Mechanical equip.	9 Masonry	10 Skylights-vents	11	12 Foundations	13 Exterior-walls	14 Masonry-repairs	15 Lintels-sills	16 Windows	17 Doors	18 Stairways	19 Paved areas	20 Handrails-steps	21 Retaining walls	22 Grating-pits-cove	23 Entrances	24 Loading platforms docks	25 Columns - beams	26 Fire escapes ladders	27 Fire alarms	28 Sidewalks	29 Landscaping	30 Fences - gates	31 Outside lights	32
A																																
B																																
C																																
D																																
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PREVENTIVE MAINTENANCE PROGRAM

Roofs

____
Date

Item # ____ Area ____ needs the following attention:

____

____

____

Item # ____ Area ____ needs the following attention:

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____

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Item # ____ Area ____ needs the following attention:

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Item # ____ Area ____ needs the following attention:

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Estimated Cost to do the Work:

Item ____ Area ____ Budget or Fund Account No. __________ $ __________
Item ____ Area ____ Budget or Fund Account No. __________ $ __________
Item ____ Area ____ Budget or Fund Account No. __________ $ __________
Item ____ Area ____ Budget or Fund Account No. __________ $ __________
Total Estimated Cost $ __________

Actual Cost: Date Completed__________
Item ____ Area ____ $ __________
Item ____ Area ____ $ __________
Item ____ Area ____ $ __________
Item ____ Area ____ $ __________

Total Cost $__________

Exhibit V

STANDARD

Seasonal Inspection **PREVENTIVE MAINTENANCE PROGRAM** **Building** ______________

November - March - June - August **ROOFS** **Date of Inspection** ______________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet. Roof Areas	1 Coping	2 Coping Joints	3 Parapet Wall	4 Flashing-Mtl Cr	5 Flashing-Base	6 Flashing-Other	7 Roof Areas	8 Ventilators	9 Exhaust Fans	10 Vent Pipes	11 Chimneys	12 Skylights-Window	13 Skylights-Screen	14 Skylights-Operat	15 Drains	16 Gutters	17 Leaders	18 Valleys	19 Attachments-Fl.Po	20 " -Structural	21 " -Cables-Rods	22 " -Ladders	23 " -Towers	24 Penthouse-Walls	25 " - Doors	26 " - Windows	27 " - Ventilators	28 Water Tower	29 Stair Well	30 Cooling Tower	31 Stairs	32 Elevator Room
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E																																
F																																
G																																
H																																
I																																
J																																
K																																

Form # PM R - 2 Green (Suggested Color)

PREVENTIVE MAINTENANCE PROGRAM

Roofs

______ Date

Item # ____ Area ____ needs the following attention:

____

____

____

Item # ____ Area ____ needs the following attention:

____

____

____

Item # ____ Area ____ needs the following attention:

____

____

____

Item # ____ Area ____ needs the following attention:

____

____

____

Estimated Cost to do the Work:

Item ____ Area ____ Budget or Fund Account No. __________ $ __________
Item ____ Area ____ Budget or Fund Account No. __________ $ __________
Item ____ Area ____ Budget or Fund Account No. __________ $ __________
Item ____ Area ____ Budget or Fund Account No. __________ $ __________
Total Estimated Cost $ __________

Actual Cost:

Date Completed __________

Item ____ Area ____ $__________
Item ____ Area ____ $__________
Item ____ Area ____ $__________
Item ____ Area ____ $__________

Total Cost $ __________

Exhibit VI

Preventive Maintenance Program
Interior
ELECTRICAL LIGHTING & FIXTURE INVENTORY

Date ____________ Building ____________________ Floor ______________ Sheet No. _________

Room Number	Number of Fixtures	Number of Tubes/Bulbs	Special A - 3	Type	Wattage	Reflectors	Diffuser	Glass

Type - F - Fluorescent I- Incandescent   Special A- Spotlight 3 - Floodlight

The Sophisticated system is a comprehensive program and offers additional benefits because of the amount of control which can be exercised. This system includes formal planning and scheduling, a complete job costing system, and a planned and followed-through work order system with work estimates. The end result will produce a maximum of savings, but will also require more administrative attention. This type of system is sufficiently complex so that use of data processing equipment in conjunction with the program may be administratively necessary and economically feasible.

The program which is set up for any particular application must reflect the management manpower available and the results desired in the form of both savings and its effectiveness.

One of the many advantages of a Planned Preventive Maintenance Program is a better utilization of funds available for maintenance and repair, or conversely, a lowering of the cost of maintenance. The system which is adopted by the college or university will offer financial returns in accordance with the degree of completeness of the program adopted. For the three systems being offered as examples, rough estimates of expected savings are as follows:

1. Simplified - 10% savings on maintenance costs
2. Standard - 20% savings on maintenance costs
3. Sophisticated - 30% savings on maintenance costs.

SIMPLIFIED SYSTEM

of

PLANNED PREVENTIVE MAINTENANCE

Simplified System of Planned Preventive Maintenance

The small, as well as the large institution can avail itself of the dividends of a Planned Preventive Maintenance Program. In the small institution, because of limited supervision and smaller size of the maintenance force, it is recommended that the Simplified program be adopted. As the institution and its facilities expand, the simplified program can be used as the basis for an expanded system.

The procedure calls for scheduling an inspection of all rooms or areas using a master inspection schedule form as a guide. The schedule is broken down by room number and month for inspection. Because of its simplicity it can be easily set up by one person in a short period of time. It is designed to provide confirmation that the inspection was actually accomplished and to provide a basis for setting up the next year's schedule. Time intervals between inspections - i.e. every three months. six months, or other convenient period - can usually be determined from past operating experience.

The inspection form is readily useable. Little effort is required on the part of the inspector to provide complete information to the maintenance department as to what repairs are required, and where. By use of the schedule and the inspection form, regular attention can be given to all physical plant areas. Minor problems can be resolved before they reach the proportions of an emergency situation. Manpower assignments can be more readily controlled -

this in itself represents savings because of better manpower utilization.

Simplified Inspection

This system of inspection is designed to provide the inspector with a check list of areas and items to be inspected. The forms cover broad rather than specific classifications; they serve to remind the inspector that an inspection of these areas of items is necessary even though they are not specifically listed.

This inspection should be limited to maintenance and repair items only; alterations, modernization, renovations or conversions should not be covered on the inspection survey.

Each inspection sheet should cover no more than one building, and in the case of a large building, the building should be divided into segments, wings, or divisions to enable a more comprehensive inspection.

The report should include all maintenance and repair work necessary to place the building in first class condition.

Finally, every attempt should be made to make certain that the inspection, as made, will reflect a true picture of the present condition of the building. A hurried inspection will not afford the supervisor of maintenance a true representation of the condition of a building. Since all other aspects of the Planned Preventive Maintenance Program are based directly on information obtained from these inspections it is mandatory that the inspection work be performed carefully.

INVENTORY - SIMPLIFIED SYSTEM

An inventory of facilities and equipment of a college or university is necessary to realize maximum utilization of the assets. Such an inventory is, however, not a fundemental requirement of a simplified Planned Preventive Maintenance Program. The only inventory which need be kept to satisfy the Simplified Planned Preventive Maintenance Program is one of spare parts which would, if the spare part were not available and if a breakdown occured, interfere with a teaching or research function. For example, if a fan belt broke on a roof fan which exhausted air from a chemistry lab, and no immediate replacement fan belt was available, the chemistry laboratory would have to be closed and the students sent home or reassigned. Therefore, an inventory control system for those parts necessary to prevent major disruption of the academic programs is a necessary part of a Simplified Planned Preventive Maintenance Program.

A prime source of information regarding needed spare parts in manufacturer's catalogs on new and recently installed equipment. All necessary details regarding various spare parts requirements are usually described in these publications. In some cases, manufacturers have actually spelled out a Preventive Maintenance Program as part of the instructions.

Where equipment is older, and printed literature is not available, a salesman or manufacturer's representive can obtain the necessary details if the serial number and other information can be obtained from the permanently mounted identification plate or tag.

In some cases where neither a catalog nor manufacturer's assistance is available, it may be necessary for certain measurements and other data to be obtained in the field before spare parts specifications can be prepared.

Spare parts protection can be provided in many ways. The most common procedure is to purchase the spare parts and to keep them in a controlled or central stock room. Some colleges have made the inventory process simpler by placing the spare parts which would be needed for emergency use near the equipment. For example, a fan belt may be stored in the fan room located on the roof where it will be available for immediate installation in case of a break.

In larger cities some colleges have used wholesalers and retailers as their source for inventory. Since many such concerns maintain a stock of repair parts, it is often simpler for the institution to maintain only the necessary source records and to let the supplier stock the parts. This reduces the cost of inventory and recordkeeping, but may increase slightly the breakdown time because of the time needed to obtain the part from an outside source.

PREVENTIVE MAINTENANCE PROGRAM
MASTER INSPECTION SCHEDULE

A good Preventive Maintenance Program calls for the scheduling of the inspections, the scheduling of the work to be done, and follow-through of the work to be done as well as the rescheduling of the future inspection.

Exhibit VII entitled Master Inspection Schedule should be used to set up an annual inspection schedule for all rooms or areas. All assignable and non-assignable space in both academic and non-academic areas should be scheduled. The areas should be designated on the drawings available to afford a permanent record as to the area designation.

When the inspection is completed, an entry should be made to indicate when the next inspection should be made. The space at the bottom half of this form should be used for such scheduling. A new schedule should be prepared each year by making reference to the previous year's schedule.

An inspection should be complete and thorough at the time it is made. Since major repairs may be possible in only a short period during vacation periods or the summer, inspections should be made prior to these periods to permit the necessary lead time to obtain the necessary administrative approval, funding, material, and manpower requirements, and/or to negotiate the necessary contracts.

EXHIBIT VII

PREVENTIVE MAINTENANCE PROGRAM

INTERIOR
MASTER ROOM INSPECTION SCHEDULE

Date Prepared

Place a (√) mark in month inspection is scheduled. When completed cross the check. (✗) ROOM NUMBER																							
January																							
February																							
March																							
April																							
May																							
June																							
July																							
August																							
September																							
October																							
November																							
December																							
RESCHEDULED INSPECTION																							
January																							
February																							
March																							
April																							
May																							
June																							
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October																							
November																							
December																							

PM-Int (1)-MS-2Y

SIMPLIFIED PREVENTIVE MAINTENANCE FORMS

SIMPLIFIED PREVENTIVE MAINTENANCE PROGRAM

The Preventive Maintenance Inspection Form should be completed in accordance with the proposed inspection schedule.

The Preventive Maintenance itemized check list should be used to complete the Inspection Form.

To complete the inspection form, place a check mark (x) in the appropriate place indicating that the area or item is in a good state of repair and that no repair work will be needed.

Place an (r) in the appropriate box to indicate that repairs are needed and make the necessary notes on the back of the form indicating the location, type of work needed, and reasons why the repairs must be made.

Place an (e) for emergency attention for repairs which will abnormally interfere with the operation of the school or college. Work which is classified as an emergency should receive first and, if it is deemed necessary, it should be expedited by telephone or by personal request.

When the work has been completed, the actual cost for record-keeping purposes should be entered in the appropriate column.

STANDARD PLANNED PREVENTIVE MAINTENANCE FORMS

STANDARD SYSTEM

The Standard Preventive Maintenance Program can be installed if there are limited inspection procedures. Many colleges and universities have a Planned Preventive Maintenance system based on an informal procedure. Such informal procedures may not be specifically known by administrators or other members of the maintenance staff. If they are not formalized, they will not receive the recognition and support of those persons concerned with the maintenance and operation of a university or college.

One of the direct benefits of a standard system of a Planned Preventive Maintenance Program, therefore, would be the establishment of a definite procedure which would receive the cooperation of all persons interested in the maintenance of the facilities.

Step #1

Since the success of the standard system depends on initiation of procedures of a Planned Preventive Maintenance Program and following them through to completion, a staff man should be appointed or assigned to the program and given the responsibility for carrying out these policies and procedures.

Step #2

Most maintenance departments which are interested in installing a

Standard system will have records covering the maintenance activities of the past years. Those areas which have caused the most problems in maintaining uninterrupted operation should receive priority consideration when the Standard system is established. The forms (See Exhibits A through S) are designed to enable the Planned Preventive Maintenance system to be installed by areas, or buildings. By installing the program in these areas or buildings where the maintenance cost is highest, direct benefits can be obtained quickly, resulting in better control and lower costs of operation and maintenance.

After the application of the program to those areas which will result in the greatest return has been accomplished, the Standard system can next be installed by the maintenance department in those areas which will best serve the needs of the department.

By using the procedures stated above, the entire system can be installed with a minimum of disruption to the normal operations of the buildings and grounds department.

Step #3

When the inspection procedure of the Standard system has been installed, the inventory part of the system should be started on the same basis as the inspection procedure, namely in these areas or buildings where the most maintenance problems arise. An inventory of the area or building needs and the installation of the inventory procedure will provide better spare parts protection and better cost control. (See Exhibits 1, 2, 3, and 4 for typical examples of inventory cards.)

However, the inventory system should be installed only in those areas where the need for spare parts protection is greatest. To install an inventory control system in all areas would be prohibitively expensive. The ultimate value of a total inventory system is questionable from the standpoint of gain to the building and grounds department. Under a Standard Preventive Maintenance Program, the inventory part of the program should only be installed in those instances where the cost of maintaining the records will be returned to the department in the form of lower maintenance cost and higher productive return.

Step #4

A master inspection schedule covering the major maintenance areas should be prepared after the system has been established. This schedule should be determined on the basis of past experience and should include the complete inspection program for all equipment and for each building for the entire year. A monthly inspection in some areas may be needed, while in other areas a six month inspection may be adequate.

An inspection schedule should be reviewed frequently during the initial installation of a system as there may be need for revision of the master schedule. Too many inspections in certain areas will be expensive; but too few inspections

Exhibit 1

Preventive Maintenance Program
Fire and Safety Equipment

Interior

Form PM-Int (10)-I

Building __________ Room No. __________ Sq. Ft. __________ Date

ITEM	CODE	QUANTITY	ITEM	CODE	QUANTITY
Gongs-Alarms			Fire Protection Lines		
Sprinkler			Stand Pipes		
Fire Extinguisher			Hose Racks		
Hoses			Manual Alarm		
Fusible Links			Manual Control		
Break Glass Station			Trouble Bell		
Alarm Boxes			Fire Door & Window		
Stations					
Control Panel					
Fire Blankets					
Cots					
Safety Shower					
Detectors					

Exhibit 2

Preventive Maintenance Program
Conference Room Inventory
Seminar Room Inventory

Interior

Form PM-Int (7)-I

Building Room No. Sq.Ft. Date

ITEM	CODE	QUANTITY	REMARKS
Furniture			
Chair			
Table			
Window Covering			
Climate Control			
Ventilation			
Visual Aids			
Sound Equipment			

Code - Chair		Window Covering		Climate Control		Ventilation	
Straight w/arms	1	Blinds	1	Air Conditioning		Fans	1
" w/o arms	2	Drapes	2	Window	1	Exhaust Fan	2
Lounge	3	Shades	3	Central	2	Blower	3

Exhibit 3

Preventive Maintenance Program
Classroom and Laboratory Inventory

Interior

Form PM-Int (3)-I

Building ______ Room No. ______ Date ______

Classroom ______ Sq. Ft. ______ Laboratory ______ Sq. Ft. ______

ITEM	CODE	QUANTITY	ITEM	CODE	QUANTITY
Furniture			Utilities		
Stations					
Desk or Tables					
Bulletin Board			Laboratory Benches		
Chalk Board			Instrument Tables		
Clock			Humidity Controls		
Coat Racks			Fume Hoods		
Visual Aids			Exhaust Fans		
Climate Control			Refrigeration		
Ventilation			Safety Shower		
Sound Equipment					

For Codes - See back of card

Exhibit 3 (continued on reverse side of card)

ITEM	CODE	ITEM	CODE	ITEM	CODE
Furniture		Slide Projector	4	Water	
Stations:		Television	5	Hot	6
Fixed Chair W/Tablet Arm	1	Projection Screens	6	Cold	7
" " W/O " "	2	Lighting Control	7	Air	8
Moveable "W/ " "	3	Sound Equipment		Gas	9
" "W/O " "	4	Microphones	1	Vacuum Lines	10
Benches W/Table	5	Speakers	2	Sewer Drains	11
" W/O "	6	Tape Machines	3	Steam Lines	12
" W/Tablet Arm	7	Recording Machines	4	Sinks	13
Theater SeatsW/Tablet Arm	8	Climate Control			
" " W/O " "	9	Air Conditioning			
Stools	10	Window	1		
Chalkboard		Central	2		
Fixed	1	Ventilation			
Moveable	2	Blowers	1		
Sliding Section	3	Fans	2		
Visual Aids		Utilities			
Movie Projector	1	Electrical Outlets			
Back Projection	2	AC 110	1		
Reflex Projector	3	" 220	2		
		DC 110	3		
		" 220	4		

Exhibit 4

Interior

Preventive Maintenance Program
Equipment Replacement Card

Form PM-R (14)-I

ITEM	LOCATION	MANUFACTURER	MODEL	REASON FOR REPLACEMEN

will defeat the program and result in higher costs to the maintenance department. The master schedule, therefore, should be carefully prepared.

STANDARD PLANNED PREVENTIVE MAINTENANCE PROGRAM

Forms

Detailed inspection forms for buildings, areas, items or equipment are used in a Standard Planned Preventive Maintenance Program. Examples of these forms are included as exhibits. The forms included in this handbook cover most of the important inspection areas of a college or university.

These forms could not be designed to cover each and every area of inspection of a particular college or university. It is expected, therefore, that the physical plant administrator and preventive maintenance inspector may make additions or deletions to the suggested items indicated on the forms.

Use of Forms

When the inspections are scheduled, the inspector should take a copy of the inspection sheet with him to record the maintenance status of the area being inspected.

Each appropriate block should have an entry to indicate that the inspection was made in accordance with the following suggested code.

(x) Place and (x) in the appropriate box on the check list where certain items are not present in the room or area.

(r) Enter (r) in the box if repairs are needed

(e) Enter (e) on the form if emergency attention is required.

If the item requires immediate attention, a telephone call to the proper person to obtain action, should be made.

(l) When equipment needs lubrication, place an (l) in the box

(p) Place a (p) in the box if the area requires painting

(w) Place a (w) in the box if area requires washing

(c) Place a (c) in the box if area needs cleaning

After the proper code letters are placed on the form, the areas or items needing attention should be recorded on the back of the form. When the work is done, the actual cost should be entered on the back of the sheet for future reference.

Check Sheets

A check sheet indicating specific points of inspection can be prepared for areas or facilities which present the greatest difficulty from a cost of maintenance standpoint. An example of such a check sheet for roofs is included for examination to indicate the method of preparation. (See Exhibit VIII)

Exhibit VIII

Seasonal Inspection

November - March - June - August

PREVENTIVE MAINTENANCE PROGRAM

ROOFS

Building ____________

Date of Inspection ____________

Check column if the maintenance is satisfactory.
If repairs are needed put (r) in column and explain on the back of this sheet

Roof Areas	1 Coping	2 Coping Joints	3 Parapet Wall	4 Flashing-Mtl Cr	5 Flashing-Base	6 Flashing-Other	7 Roof Areas	8 Ventilators	9 Exhaust Fans	10 Vent Pipes	11 Chimneys	12 Skylights-Window	13 Skylights-Screen	14 Skylights-Operat	15 Drains	16 Gutters	17 Leaders	18 Valleys	19 Attachments-Fl.Po.	20 " -Structural	21 " -Cables-Rods	22 " -Ladders	23 " - Towers	24 Penthouse-Walls	25 " -Doors	26 " -Windows	27 " -Ventilators	28 Water Tower	29 Stair Well	30 Cooling Tower	31 Stairs	32 Elevator Room
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Form # PM - R - 2 Green (Suggested Color)

PREVENTIVE MAINTENANCE PROGRAM

ROOFS

Date ________

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Estimated Cost to do the Work:

Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________

Total Estimated Cost $ ________

Actual Cost: Date Completed

Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________

Total Cost $ ________

STANDARD PLANNED PREVENTIVE MAINTENANCE PROGRAM

Inspection Forms and Check List

The following inspection forms and check lists have been prepared to assist colleges and universities in establishing the Standard Planned Preventive Maintenance Program.

Exhibit A	Roofs
Exhibit A_1	Roofs - Inspection check list
Exhibit B	Building Exteriors
Exhibit C	Grounds
Exhibit D	Building Interiors - Structural & Finishes
Exhibit E	Paint & Finishes
Exhibit F	Electrical Lighting & Fixtures
Exhibit G	Electrical (Other than Electrical Lighting & Fixtures
Exhibit H	Heating & Ventilating
Exhibit I	Plumbing
Exhibit J	Fire & Safety Equipment
Exhibit K	Kitchen Equipment
Exhibit L	Pneumatic Controls
Exhibit M	Motors
Exhibit N	Elevators
Exhibit O	Air Conditioning
Exhibit P	Air Compressors
Exhibit Q	Exhaust Fan
Exhibit R	Boilers - Daily, Weekly, Annual Internal & External
Exhibit S	Pump, Turbine Drive - Annual Internal & External

Exhibit A

Seasonal Inspection PREVENTIVE MAINTENANCE PROGRAM Building ________________

November - March - June - August ROOFS Date of Inspection ________________

Check column if the maintenance is satisfactory.
If repairs are needed put (r) in column and explain on the back of this sheet.

Roof Areas	1 Coping	2 Coping Joints	3 Papapet Wall	4 Flashing-Mtl Cr	5 Flashing-Base	6 Flashing-Other	7 Roof Areas	8 Ventilators	9 Exhaust Fans	10 Vent Pipes	11 Chimneys	12 Skylights-Window	13 Skylights-Screen	14 Skylights-Operat	15 Drains	16 Gutters	17 Leaders	18 Valleys	19 Attachments-FLR	20 " - Structural	21 " - Cables-Rods	22 " - Ladders	23 " - Towers	24 Penthouse-Walls	25 " - Doors	26 " - Windows	27 " - Ventilators	28 Water Tower	29 Stair Well	30 Cooling Tower	31 Stairs	32 Elevator Room
A																																
B																																
C																																
D																																
E																																
F																																
G																																
H																																
I																																
J																																
K																																

Form # PM - R - 2 Green (Suggested Color)

PREVENTIVE MAINTENANCE PROGRAM

ROOFS

Date

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Estimated Cost to do the Work:

Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________

Total Estimated Cost $ ________

Actual Cost: Date Completed

Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________

Total Cost $ ________

Exhibit A_1

ROOFING INSPECTION
CHECK LIST

Use Form #PM-R-2 Green

Action Items

Clean gutters, drain screens and leaders as required.

Clean roof of all debris such as leaves, paper, cans, branches, twigs, construction materials, etc.

Inspection

(Place an (r) in appropriate box if the following items have any of the following evidences of failure.)

Parapet Wall and Coping

Do the mortar joints of the parapet wall need pointing up?

Are the bricks, blocks, etc. loose or spalling?

Are the walls cracking the permit water to leak into wall?

Is the mortar joint under cap stone cracked or loose?

Are the coping stones or metal coping loose, broken, shifted?

Does the coping stone have small cracks or spalling?

Is the coping joint mortar or seal permitting water to seep through joints?

Inspection (continued)

Flashing - Parapet Walls, Penthouse Walls, Vent Stacks, Skylights, Roof Drains, Towers, Tanks, Ventilators, Attachments, and Roof, i. e., Guy Wires, Electric Wires, etc.

Has the flashing pulled away from the parapet wall to allow water to seep through paint into the interior?

Is the flashing damaged or loose?

Has the flashing properly sealed the parapet wall or counter flashing?

Has frost loosened the flashing from its fastenings and opened joints?

Is the flashing corroded?

Built Up Roof

Has the roof section been cleaned and condition of felts checked for holes, cracks, opened seams?

Has the roof deck been examined to determine the condition of the roof i. e., deterioration of concrete deck or wooden roof deck?

Are there blisters which will entrap air and water?

Are all felts secured?

Is it necessary to apply a roof coating?

Are the drains cleaned of all debris and strainers in good conditions?

Are the gutters and leaders clean? Do they need repair?

Are the valleys free from debris and do they need resurfacing?

Are there any low spots where water continually stands?

Tile or Brick Roof

Has the roof section been cleaned and condition checked for holes, cracks, open mortar joints?

Are the expansion joints clean and working?

Has the roof deck been examined to determine tile or brick bedding to ascertain soundness?

Are the joints between each tile or brick firm so that continued exposure to extreme heat, cold and moisture will not affect the roof decks?

Are the drains cleaned of all debris and strainers in good condition?

Are the gutter and leaders clean? Do they need repair?

Are the valleys free from debris and do they need resurfacing?

Are there any low spots where water continually stands?

Skylights

Are there any loose or broken glass panes?

Is the glazing compound solid?

Do the metal parts need painting?

Does the mechanical or electrical operating window work properly?

Does the protective screen need repainting or repair?

Penthouse, Elevator, Machinery Rooms, Water Towers, Ventilation Machinery Rooms

Are the walls in good repair, i.e., free from cracks or evidence of water penetration or structural deterioration?

Are the doors and door frames in good condition and operating?

Are the windows, ventilating opening, etc. in good repair?

Have the roof, flashing, skylights, etc. of the roof projection room been checked in accordance with previous check lists?

Mechanical Equipment

Was all mechanical equipment located on roof checked for wind or snow damage such as loose or broken braces, supports, metal work, etc.

Exhibit B

Quarterly Inspection

PREVENTIVE MAINTENANCE PROGRAM

BUILDING EXTERIOR

Building ____________________

Date of Inspection ____________________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet. Exterior Areas	Foundation Walls 1	Light Wells 2	Gratings 3	Areaways 4	Ornamental Metal 5	Stairs - Steps 6	Railings 7	Entrances 8	Ext.Walls-General 9	" " - Coping 10	" " -Cornices 11	" " - Mortar 12	Caulking 13	Weep Holes 14	Window - Sill 15	" - Glass 16	" - Glazing 17	" - Lintel 18	"-Screens-Bars 19	" - Paint 20	Fire Escapes 21	Loading Dock 22	Elevator & Hoists 23	Lights 24	Fire Alarms 25	Drains 26	Down Spouts 27	Columns 28	Metal Grating 29	Canopies 30	Siamese 31	32	
A																																	
B																																	
C																																	
D																																	
E																																	
F																																	
G																																	
H																																	
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J																																	
K																																	

Form PM - Exterior - 2 Yellow (Suggested Color)

PREVENTIVE MAINTENANCE PROGRAM

BUILDING EXTERIOR

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Date

Item # ___ Area ___ needs the following attention:

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Item # ___ Area ___ needs the following attention:

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Item # ___ Area ___ needs the following attention:

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Item # ___ Area ___ needs the following attention:

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Item # ___ Area ___ needs the following attention:

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Estimated Cost to do the Work:

Item ___ Area ___ Budget or Fund Account No. __________ $ __________
Item ___ Area ___ Budget or Fund Account No. __________ $ __________
Item ___ Area ___ Budget or Fund Account No. __________ $ __________
Item ___ Area ___ Budget or Fund Account No. __________ $ __________
Item ___ Area ___ Budget or Fund Account No. __________ $ __________
Total Estimated Cost $ __________

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Actual Cost: Date Completed
Item ___ Area ___ $ __________
Item ___ Area ___ $ __________
Item ___ Area ___ $ __________
Item ___ Area ___ $ __________
Item ___ Area ___ $ __________

Total Cost $ __________

Exhibit C

Seasonal

PREVENTIVE MAINTENANCE PROGRAM

GROUNDS

Date of Inspection __________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet. Area	Lawn 1	Trees 2	Shrubs 3	Hedges 4	Vines 5	Flower Beds 6	Ground Cover 7	Planters 8	Sidewalks 9	Stairs 10	Parking Area 11	Seats - Benches 12	Driveways 13	Terraces-Patio 14	Walls 15	Railing 16	Fences 17	Lights 18	19	20	21	22
A																						
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E																						
F																						
G																						
H																						
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Form PM - Grounds - 2 - Brown (Suggested Color)

PREVENTIVE MAINTENANCE PROGRAM

GROUNDS

________ Date

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Item # ___ Area ___ needs the following attention:

Estimated Cost to do the Work:

Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________
Item ___ Area ___ Budget or Fund Account No. ________ $ ________

Total Estimated Cost $ ________

Actual Cost:

Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________
Item ___ Area ___ $ ________

Total Cost $ ________

Exhibit D

Building No.

Floor

PREVENTIVE MAINTENANCE PROGRAM
Interior
ROOMS OR AREA
INSPECTION

Date of Inspection__________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	1 Ceiling-Structural	2 Ceiling-Finish	3 Walls-Structural	4 Walls-Finish	5 Floors-Structural	6 Floors-Finish	7 Trim-Structural	8 Trim-Finish	9 CoveBase-Struct.	10 Cove-Base-Finish	11 Doors-Structural	12 Doors-Finish	13 Windows-Struct.	14 Windows-Finish	15 Shades, Blinds&Drapes	16 Chalkboard	17 Bulletin Board	18 Lights	19 Radiators	20 Ventilation	21 AirConditioning	22 Sinks	23 Floor Drains	24 Sprinklers	25 Showers	26 Electrical Outlet	27 Electrical Switch	28 Steps-Stairs	29 Platforms-Stage	30 Closets	31 Partition-Moveable	

Form PM - Interior (2) - Gen R or A - 2-Y

PREVENTIVE MAINTENANCE PROGRAM

ROOMS OR AREA

________ Date

Item # ___ R or A ___ needs the following attention:

Item # ___ R or A ___ needs the following attention:

Item # ___ R or A ___ needs the following attention:

Item # ___ R or A ___ needs the following attention:

Item # ___ R or A ___ needs the following attention:

Estimated Cost to do the work:

Item___R or A___ Budget or Fund Account No. ________ $ ____________
Item___R or A___ Budget or Fund Account No. ________ $ ____________
Item___R or A___ Budget or Fund Account No. ________ $ ____________
Item___R or A___ Budget or Fund Account No. ________ $ ____________
Item___R or A___ Budget or Fund Account No. ________ $ ____________
Total Estimated Cost $ ____________

Actual Cost: Date Completed __________

Item ___ R or A ___ $__________
Item ___ R or A ___ $__________
Item ___ R or A ___ $__________
Item ___ R or A ___ $__________
Item ___ R or A ___ $__________

Total Cost $____________

Exhibit F

PREVENTIVE MAINTENANCE PROGRAM

Building ____________

Annual Inspection

Interior

ELECTRICAL LIGHTING AND FIXTURES

Date of Inspection ______

Check column if the maintenance is satisfactory.
If repairs are needed put (r) in column back of this sheet

Room No.	1 Tube	2 Diffuser	3 Starter	4 Ballast	5 ElectricalConn	6 Switch	7 Safety Chains	8 Hinges	9 DirtAccumulation	10 Bulbs	11 Switch	12 Pull Chain	13 Globes	14 Shades	15 Spotlights	16 Floodlights								

Form #PM - Int (4) - El & F -2-Y

Exhibit E

PREVENTIVE MAINTENANCE PROGRAM

PAINT INSPECTION

Annual Inspection

Building ____________________
Floor ____________________
Date of Inspection ______________

ROOM NUMBER	CONDITION								
	TRIM	WAIN-SCOT	WALLS				CEILING	DOORS	FLOOR
			North	East	South	West			

CONDITION

E - Excellent
G - Good
F - Fair
P - Paint
W - Wash

Form #PM - Int (3) - P - 2Y

PREVENTIVE MAINTENANCE PROGRAM

ELECTRICAL LIGHTING AND FIXTURES

________ Date

Item # ___ EL&F ___ needs the following attention:

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Item # ___ EL&F ___ needs the following attention:

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Item # ___ EL&F ___ needs the following attention:

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Item # ___ EL&F ___ needs the following attention:

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Item # ___ EL&F ___ needs the following attention:

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Estimated Cost to do the Work:

Item___ EL&F___ Budget or Fund Account No. ________ $ ______________
Item___ EL&F___ Budget or Fund Account No. ________ $ ______________
Item___ EL&F___ Budget or Fund Account No. ________ $ ______________
Item___ EL&F___ Budget or Fund Account No. ________ $ ______________
Item___ EL&F___ Budget or Fund Account No. ________ $ ______________
Total Estimated Cost $ ______________

Actual Cost: Date Completed ______________

Item___ EL&F___ $__________
Item___ EL&F___ $__________
Item___ EL&F___ $__________
Item___ EL&F___ $__________
Item___ EL&F___ $__________

Total Cost $ ______________

Exhibit G

Annual Inspection

PREVENTIVE MAINTENANCE PROGRAM
Interior
ELECTRICAL

Building ____________

Date of Inspection ________

Check column if the maintenance is satisfactory.
If repairs are needed put (r) in column and explain on the back of this sheet.

	1 Light Switches	2 Outlets-Convenience	3 " -Pub Address	4 " -TV	5 " -Clocks	6 Panels-Electrical	7 Panels-Distribution	8 Telephone	9 Wire Ways	10 Feeders	11 PreWired Strips	12 Clock	13 Conduit	14 Germicidal Lights	15 Speakers - PA	16 Lamps-Floor Table							
A																							
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C																							
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Form #PM - Int (5) - E-2-Y

PREVENTIVE MAINTENANCE PROGRAM

ELECTRICAL

__________ Date

Item # ___ E ___ needs the following attention:

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Item # ___ E ___ needs the following attention:

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Item # ___ E ___ needs the following attention:

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Item # ___ E ___ needs the following attention:

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Item # ___ E ___ needs the following attention:

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Estimated Cost to do the Work:

Item ___ E ___ Budget or Fund Account No. __________ $ _________
Item ___ E ___ Budget or Fund Account No. __________ $ _________
Item ___ E ___ Budget or Fund Account No. __________ $ _________
Item ___ E ___ Budget or Fund Account No. __________ $ _________
Item ___ E ___ Budget or Fund Account No. __________ $ _________

Total Estimated Cost $ _________

Actual Cost:

Date Completed ______________

Item ___ E ___ $ _________
Item ___ E ___ $ _________
Item ___ E ___ $ _________
Item ___ E ___ $ _________
Item ___ E ___ $ _________

Total Cost $ ______________

Exhibit H

PREVENTIVE MAINTENANCE PROGRAM
Interior

Building ____________

Annual Inspection

HEATING & VENTILATING

Date of Inspection ____________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Radiators 1	Thermostats 2	Valves & Traps 3	Piping 4	Ventilators 5	Air Conditioning 6	Exhaust System 7	Switches 8	Gages 9	Dampers 10	Relays 11	Aquartets 12	Fume Hoods 13	Fans 14	Diffusers 15							

Form #PM - Int (6) - H & V -2Y

PREVENTIVE MAINTENANCE PROGRAM

HEATING & VENTILATING

________ Date

Item #___ H & V___ needs the following attention:

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Item #___ H & V___ needs the following attention:

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Item #___ H & V___ needs the following attention:

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Item #___ H & V___ needs the following attention:

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Item #___ H & V___ needs the following attention:

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Estimated Cost to do the Work:

Item___ H & V___ Budget or Fund Account No. __________ $ ______________
Item___ H & V___ Budget or Fund Account No. __________ $ ______________
Item___ H & V___ Budget or Fund Account No. __________ $ ______________
Item___ H & V___ Budget or Fund Account No. __________ $ ______________
Item___ H & V___ Budget or Fund Account No. __________ $ ______________

Total Estimated Cost $ ______________

Actual Cost: Date Completed __________

Item___ H & V___ $____________
Item___ H & V___ $____________
Item___ H & V___ $____________
Item___ H & V___ $____________
Item___ H & V___ $____________

Total Cost $ ______________

Exhibit I

Annual Inspection

PREVENTIVE MAINTENANCE PROGRAM
Interior
PLUMBING

Building ____________

Date of Inspection ____________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Valves 1	Water Closets 2	Urinals 3	Sinks 4	Water Coolers 5	Showers 6	Floor Drains 7	Tubs 8	Piping-General 9	-Water 10	Compressed Air 11	Piping-Gas 12	Piping-Other 13										

Form #PM - Int (7) - Plbg - 2-Y

PREVENTIVE MAINTENANCE PROGRAM

PLUMBING

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Date

Item # ___ Plbg ___ needs the following attention:

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Item # ___ Plbg ___ needs the following attention:

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Item # ___ Plbg ___ needs the following attention:

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Item # ___ Plbg ___ needs the following attention:

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Item # ___ Plbg ___ needs the following attention:

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Estimated Cost to do the Work:

Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________
Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________
Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________
Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________
Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________

Total Estimated Cost $ __________

Actual Cost: Date Completed __________

Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________
Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________
Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________
Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________
Item ___ Plbg ___ Budget or Fund Account No. __________ $ __________

Total Cost $ __________

Exhibit J

PREVENTIVE MAINTENANCE PROGRAM
Interior
FIRE AND SAFETY EQUIPMENT

Building ________

Annual Sinspection

Date of Inspection ______

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Fire Detection 1	Detectors&Piping 2	Stations 3	Gongs-Alarms 4	Control Panels 5	Sprinklers 6	FireExtinguishers 7	Blankets 8	Cots 9	Safety Showers 10	FireProtectionLines 11	Stand Pipes 12	Hose Racks 13	Hoses 14	Siamese 15	Alarm Boxes 16	BreakGlassStations 17	Manual Alarms 18	Manual Controls 19	Trouble Bell 20	FireDoors&Windows 21	Fusible Links 22

Form #PM - Int (9) - F & SE -2Y

PREVENTIVE MAINTENANCE PROGRAM

FIRE AND SAFETY EQUIPMENT

______ Date

Item #___ F&SE___ needs the following attention:

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Item #___ F&SE___ needs the following attention:

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Item #___ F&SE___ needs the following attention:

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Item #___ F&SE___ needs the following attention:

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Item #___ F&SE___ needs the following attention:

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Estimated Cost to do the Work:

Item___ F&SE___ Budget or Fund Account No. __________ $ __________
Item___ F&SE___ Budget or Fund Account No. __________ $ __________
Item___ F&SE___ Budget or Fund Account No. __________ $ __________
Item___ F&SE___ Budget or Fund Account No. __________ $ __________
Item___ F&SE___ Budget or Fund Account No. __________ $ __________
Total Estimated Cost $ __________

Actual Cost: Date Completed __________

Item___ F&SE___ $__________
Item___ F&SE___ $__________
Item___ F&SE___ $__________
Item___ F&SE___ $__________
Item___ F&SE___ $__________
Total Cost $______________

Exhibit K

Annual Inspection

PREVENTIVE MAINTENANCE PROGRAM
Interior

KITCHEN EQUIPMENT INSPECTION
(Food Service)

Building ____________________

Date of Inspection____________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	OVENS	FRYERS	STEAM KETTLES	POTATO PEELER	BUFFALO CUTTER	SLICER	MEAT SAW	MIXER	STOVES	BROILERS	EXHAUST HOODS	GREASE TRAPS	DISHWASHER	TOASTERS	COFFEE URNS	MILK DISPENSER	JUICE DISPENSER	BREAD DISPENSER	GRIDDLES	REFRIGERATION	STEAM HEAT EXCH.											

Form #PM - Int (10) - KE - 2Y

PREVENTIVE MAINTENANCE PROGRAM

KITCHEN EQUIPMENT INSPECTION

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Date

Item # ____ KE ____ needs the following attention:

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Item # ____ KE ____ needs the following attention:

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Item # ____ KE ____ needs the following attention:

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Item # ____ KE ____ needs the following attention:

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Estimated Cost to do the Work:
Item ____ KE ____ Budget or Fund Account No. __________ $__________
Item ____ KE ____ Budget or Fund Account No. __________ $__________
Item ____ KE ____ Budget or Fund Account No. __________ $__________
Item ____ KE ____ Budget or Fund Account No. __________ $__________
Item ____ KE ____ Budget or Fund Account No. __________ $__________
Total Estimated Cost $__________

Actual Cost: Date Completed __________
Item ____ KE ____ $ __________
Item ____ KE ____ $ __________
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Item ____ KE ____ $ __________
Item ____ KE ____ $ __________

Total Cost $ __________

Exhibit L

Preventive Maintenance Program
Phase IV
Pneumatic Control System

Location:

Date:

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Thermostat	Temp. Control	Relay	Valve	Dampers	Pneumatic Motor	Electric Motor	Lines	Air Compressor																								

Form #PM-IV-Pneu. Cont.-(2)

PREVENTIVE MAINTENANCE PROGRAM

PNEUMATIC CONTROL SYSTEM

____________ Date

Item # ____ PNEUMATIC CONTROL SYSTEM ____ needs the following attention:

Item # ____ PNEUMATIC CONTROL SYSTEM ____ needs the following attention:

Item # ____ PNEUMATIC CONTROL SYSTEM ____ needs the following attention:

Item # ____ PNEUMATIC CONTROL SYSTEM ____ needs the following attention:

Item # ____ PNEUMATIC CONTROL SYSTEM ____ needs the following attention:

Estimated Cost to do the Work:

Item ____ Pneu.Cont. ____ Budget or Fund Account No. ____________ $____________
Item ____ Pneu.Cont. ____ Budget or Fund Account No. ____________ $____________
Item ____ Pneu.Cont. ____ Budget or Fund Account No. ____________ $____________
Item ____ Pneu.Cont. ____ Budget or Fund Account No. ____________ $____________
Item ____ Pneu.Cont. ____ Budget or Fund Account No. ____________ $____________

Total Estimated Cost $____________

Actual Cost: Date Completed ____________

Item ____ Pneu.Cont. ____ $____________
Item ____ Pneu.Cont. ____ $____________
Item ____ Pneu.Cont. ____ $____________
Item ____ Pneu.Cont. ____ $____________
Item ____ Pneu.Cont. ____ $____________

Total Cost $____________

Exhibit M

PREVENTIVE MAINTENANCE PROGRAM

PHASE IV

Building

MOTORS

Date of Inspection

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Lubrication	Air Vents	Bearing	Bearing Seal	Mounts	Lube. Wick	Lube. Waste	Brushes	Commutator	Governor	Ground	Belts	Shaft	Pulley	Couplings	Load	Leads	Motor Starter	Overheating														

Form #PM-IV-Motors-(2)

PREVENTIVE MAINTENANCE PROGRAM

MOTORS

____________ Date

Item # ____ MOTORS ____ needs the following attention:

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Item # ____ MOTORS ____ needs the following attention:

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Item # ____ MOTORS ____ needs the following attention:

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Item # ____ MOTORS ____ needs the following attention:

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Item # ____ MOTORS ____ needs the following attention:

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Estimated Cost to do the Work:
Item ____ MOTORS ____ Budget or Fund Account No. ____________ $____________
Item ____ MOTORS ____ Budget or Fund Account No. ____________ $____________
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Item ____ MOTORS ____ Budget or Fund Account No. ____________ $____________
Item ____ MOTORS ____ Budget or Fund Account No. ____________ $____________

Total Estimated Cost $____________

Actual Cost: Date Completed____________
Item ____ MOTORS ____ $____________
Item ____ MOTORS ____ $____________
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Item ____ MOTORS ____ $____________

Total Cost $____________

Exhibit N

PREVENTIVE MAINTENANCE PROGRAM

PHASE IV

Building

ELEVATORS

Date of Inspection

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Controller	Governor	Deflector sheave	Hoist ropes	Roller guides	Guide rails	Counter weight buffer	Limit switches	Stopping switch	Door controllers	Position indicator	Emergency stop switch	Emergency alarm	Traveling cables	Car signals	Safety system	Automatic door	Door hangers																

Form #PM-IV-Elevators (2)

PREVENTIVE MAINTENANCE PROGRAM

ELEVATORS

__________ Date

Item # ____ ELEVATORS ____ needs the following attention:

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Item # ____ ELEVATORS ____ needs the following attention:

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Item # ____ ELEVATORS ____ needs the following attention:

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Item # ____ ELEVATORS ____ needs the following attention:

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Item # ____ ELEVATORS ____ needs the following attention:

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Estimated Cost to do the Work:

Item ____ ELEVATORS ____ Budget or Fund Account No. __________ $__________
Item ____ ELEVATORS ____ Budget or Fund Account No. __________ $__________
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Item ____ ELEVATORS ____ Budget or Fund Account No. __________ $__________
Item ____ ELEVATORS ____ Budget or Fund Account No. __________ $__________

Total Estimated Cost $__________

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Actual Cost: Date Completed__________

Item ____ ELEVATORS ____ $______________
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Item ____ ELEVATORS ____ $______________

Total Cost $__________

Exhibit O

PREVENTIVE MAINTENANCE PROGRAM

PHASE IV

AIR CONDITIONING

Location

Date

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Controls	Dampers	Condenser Coils	Evaporator Coils	Fan	Seals	Drip Pan	Belt Drives	Control Valves	Float Valves	Humidifiers	Reheat Coils	Ducts	Insulation	Compressor	Cooling Tower	Expansion Tank	Filters	Cooling Coils	Motor Lubrication												

Form #PM-IV-Air Cond.-(2)

PREVENTIVE MAINTENANCE PROGRAM

AIR CONDITIONING

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Date

Item # ___ AIR COND. ___ needs the following attention:

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Item # ___ AIR COND. ___ needs the following attention:

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Item # ___ AIR COND. ___ needs the following attention:

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Item # ___ AIR COND. ___ needs the following attention:

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Item # ___ AIR COND. ___ needs the following attention:

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Estimated Cost to do the Work:
Item ___ AIR COND. ___ Budget or Fund Account No. __________ $ ____________
Item ___ AIR COND. ___ Budget or Fund Account No. __________ $ ____________
Item ___ AIR COND. ___ Budget or Fund Account No. __________ $ ____________
Item ___ AIR COND. ___ Budget or Fund Account No. __________ $ ____________
Item ___ AIR COND. ___ Budget or Fund Account No. __________ $ ____________

Total Estimated Cost $ ____________

Actual Cost: Date Completed ____________
Item ___ AIR COND. ___ $____________
Item ___ AIR COND. ___ $____________
Item ___ AIR COND. ___ $____________
Item ___ AIR COND. ___ $____________
Item ___ AIR COND. ___ $____________

Total Cost $____________

Exhibit P

PREVENTIVE MAINTENANCE PROGRAM
PHASE IV

Location　　　　AIR COMPRESSORS　　　　Date

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of the sheet.	Storage Tank	Lubricant	Filter	Air Press Gauge	Tank Drain	Unloader	Electrical	Drive Belts	Engine Starter	Exhaust System	Spark Plugs	Glow Plugs	Fuel System	Fuel Filters																			

Form #PM-IV-Air Comp.-(2)

PREVENTIVE MAINTENANCE PROGRAM
AIR COMPRESSORS

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Date

Item # ___ AIR COMPRESSORS ___ needs the following attention:

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Item # ___ AIR COMPRESSORS ___ needs the following attention:

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Item # ___ AIR COMPRESSORS ___ needs the following attention:

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Item # ___ AIR COMPRESSORS ___ needs the following attention:

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Item # ___ AIR COMPRESSORS ___ needs the following attention:

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Estimated Cost to do the Work:

Item ___ AIR COMPRESSORS ___ Budget or Fund Account No. ________ $________
Item ___ AIR COMPRESSORS ___ Budget or Fund Account No. ________ $________
Item ___ AIR COMPRESSORS ___ Budget or Fund Account No. ________ $________
Item ___ AIR COMPRESSORS ___ Budget or Fund Account No. ________ $________
Item ___ AIR COMPRESSORS ___ Budget or Fund Account No. ________ $________

Total Estimated Cost $________

Actual Cost: Date Completed_____

Item ___AIR COMPRESSORS___ $__________
Item ___AIR COMPRESSORS___ $__________
Item ___AIR COMPRESSORS___ $__________
Item ___AIR COMPRESSORS___ $__________
Item ___AIR COMPRESSORS___ $__________

Total Cost $________

Exhibit Q

PREVENTIVE MAINTENANCE PROGRAM

PHASE IV

EXHAUST FAN

Location

Date of Inspection

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Controls	Wiring	Switches	Speed Controller	Shutter	Bearings	Mount Ring	Ducts	Dirt on Blades	Dirt on Motor Vents	Sheaves	Drive Belt	Shaft Coupling	Weather Closures																				

Form #PM-IV-ExF-(2)

PREVENTIVE MAINTENANCE PRODUGRAM

EXHAUST FANS

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Date

Item #___EXHAUST FANS___needs the following attention:

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Item #___EXHAUST FANS___needs the following attention:

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Item #___EXHAUST FANS___needs the following attention:

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Item #___EXHAUST FANS___needs the following attention:

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Item #___EXHAUST FANS___needs the following attention:

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Estimated Cost to do the Work:

Item___EXHAUST FANS___Budget or Fund Account No. ____________ $__________
Item___EXHAUST FANS___Budget or Fund Account No. ____________ $__________
Item___EXHAUST FANS___Budget or Fund Account No. ____________ $__________
Item___EXHAUST FANS___Budget or Fund Account No. ____________ $__________
Item___EXHAUST FANS___Budget or Fund Account No. ____________ $__________

Total Estimated Cost $__________

Actual Cost: Date Completed__________

Item___EXHAUST FANS___ $__________
Item___EXHAUST FANS___ $__________
Item___EXHAUST FANS___ $__________
Item___EXHAUST FANS___ $__________
Item___EXHAUST FANS___ $__________

Total Cost $__________

Exhibit R

PREVENTIVE MAINTENANCE PROGRAM
PHASE IV

HIGH PRESSURE POWER BOILER LOG

Boiler No. ______
Date ______

	Check and Record Hourly						Test every 4 hours				Check every 4 hours							Check Each Shift						
																Deaerator		Water Treatment						
Time	Water Level	Steam Pressure	Main Line Pressure	Burner Operation	Flue Gas Temp.	Furnace Draft	Low Water Cut-Off	Water Level Control	Water Column	Water Gauge Glass	Feed Pumps	Condensate Pump	Fuel Supply Pump	Oil Pressure	Oil Temperature	water level	water temp	alk.	sant.	b.u.	cond. treat tank	Boiler Blow Down	Blow Soot	Remarks
7:00																								
8:00																								
9:00																								
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PREVENTIVE MAINTENANCE PROGRAM

BOILERS

Item#___BOILERS___needs the following attention:

Item#___BOILERS___needs the following attention:

Item#___BOILERS___needs the following attention:

Item#___BOILERS___needs the following attention:

Item#___BOILERS___needs the following attention:

Estimated Cost to do the Work:
Item___BOILERS___Budget or Fund Account No. ____________ $____________
Item___BOILERS___Budget or Fund Account No. ____________ $____________
Item___BOILERS___Budget or Fund Account No. ____________ $____________
Item___BOILERS___Budget or Fund Account No. ____________ $____________
Item___BOILERS___Budget or Fund Account No. ____________ $____________

Total Estimated Cost $____________

Actual Cost: Date Completed____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________

Total Cost $______________

Exhibit R

PREVENTIVE MAINTENANCE PROGRAM

PHASE IV

BOILERS

Weekly Inspection

Boiler No.

Date of Inspection ______________

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Safety Valve	Refractories	Soot Accumulation	Air Leakages	Corrosion	Water Leakage	Burner Operation																								

Form #PM-IV-Boiler-(3)

PREVENTIVE MAINTENANCE PROGRAM

BOILERS

____
Date

Item #___BOILERS___needs the following attention:

Item #___BOILERS___needs the following attention:

Item #___BOILERS___needs the following attention:

Item #___BOILERS___needs the following attention:

Item #___BOILERS___needs the following attention:

Estimated Cost to do the Work: $________________

Item___BOILERS___Budget or Fund Account No. ________________ $________________
Item___BOILERS___Budget or Fund Account No. ________________ $________________
Item___BOILERS___Budget or Fund Account No. ________________ $________________
Item___BOILERS___Budget or Fund Account No. ________________ $________________
Item___Boilers___Budget or Fund Account No. ________________ $________________

Total Estimated Cost $________________

Date Completed____________

Actual Cost:

Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________

Total Cost $________________

Exhibit R

PREVENTIVE MAINTENANCE PROGRAM

Annual Inspection
External

PHASE IV
BOILERS

Boiler No.
Date of Inspection

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Boiler Setting	Obs. Insp. Ports	Soot Blowers	Blow Off Valves	Piping - Water	Piping - Draft	Pressure Gauges	Gauge Cocks	Try Cocks	Floats	Float Chamber	Burner Parts	Air Leakage	Stoker	Wear Plates	Wind Boxes	Tuyere Grids	Sprockets	Chains	Stoker Drive	Belt	Lubrication											

Form #PM-IV-Boiler-(5)

PREVENTIVE MAINTENANCE PROGRAM

BOILERS

______________ Date

Item #___BOILERS___needs the following attention:

Item #___BOILERS___needs the following attention:

Item #___BOILERS___needs the following attention:

Item #___BOILERS___needs the following attention:

Item #___BOILERS___needs the following attention:

Estimated Cost to do the Work:

Item___BOILERS___Budget or Fund Account No. ____________ $______________
Item___BOILERS___Budget or Fund Account No. ____________ $______________
Item___BOILERS___Budget or Fund Account No. ____________ $______________
Item___BOILERS___Budget or Fund Account No. ____________ $______________
Item___BOILERS___Budget or Fund Account No. ____________ $______________

Total Estimated Cost $______________

Actual Cost: Date Completed____________

Item___BOILERS___ $______________
Item___BOILERS___ $______________
Item___BOILERS___ $______________
Item___BOILERS___ $______________
Item___BOILERS___ $______________

Total Cost $______________

Exhibit R

PREVENTIVE MAINTENANCE PROGRAM
PHASE IV
BOILERS

Annual Inspection
Internal - Fire & Water Side

Boiler No.
Date of Inspection

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Reteactories	Baffles	Tubes, Corrosion	Tube, Warpage	Soot Blower	Dampers	Scale Deposits	Cracked Metal	Pipe,-Feed Water	Stay Bolts																							

Form #PM-IV-Boiler-(4)

PREVENTIVE MAINTENANCE PROGRAM

BOILERS

____________ Date

Item #___BOILERS___needs the following attention:

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Item #___BOILERS___needs the following attention:

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Item #___BOILERS___needs the following attention:

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Item #___BOILERS___needs the following attention:

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Item #___BOILERS___needs the following attention:

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Estimated Cost to do the Work:
Item___BOILERS___Budget or Fund Account No. ____________ $____________
Item___BOILERS___Budget or Fund Account No. ____________ $____________
Item___BOILERS___Budget or Fund Account No. ____________ $____________
Item___BOILERS___Budget or Fund Account No. ____________ $____________
Item___BOILERS___Budget or Fund Account No. ____________ $____________

Total Estimated Cost $____________

Actual Cost: Date Completed____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________
Item___BOILERS___ $____________

Total Cost $____________

Exhibit S

PREVENTIVE MAINTENANCE PROGRAM
PHASE IV
Boiler Auxiliary Equipment

Boiler No.

Date

PUMP

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Vibration	Bearing Temp.	Oil Level	Stuffing Box	Suct-Disch. Press	Shaftcoupling	Controls	Bearings															

Form #PM-IV-Pump-(2)

PREVENTIVE MAINTENANCE PROGRAM
Boiler Auxiliary Equipment
PUMP

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Item#___PUMP___needs the following attention:

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Item#___PUMP___needs the following attention:

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Item#___PUMP___needs the following attention:

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Item#___PUMP___needs the following attention:

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Item#___PUMP___needs the following attention:

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Estimated Cost to do the Work:
Item___PUMP___Budget or Fund Account No. ____________ $____________
Item___PUMP___Budget or Fund Account No. ____________ $____________
Item___PUMP___Budget or Fund Account No. ____________ $____________
Item___PUMP___Budget or Fund Account No. ____________ $____________
Item___PUMP___Budget or Fund Account No. ____________ $____________

Total Estimated Cost $____________

Actual Cost Date Completed ____________
Item___PUMP___ $__________
Item___PUMP___ $__________
Item___PUMP___ $__________
Item___PUMP___ $__________
Item___PUMP___ $__________

Total Cost $____________

Exhibit S

PREVENTIVE MAINTENANCE PROGRAM
PHASE IV
Boiler Auxiliary Equipment
TURBINE DRIVE

Boiler No.

Date

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Wheel	Nozzles	Blading	Bearings	Governor	Overspeed Device	Relief Valve	Oil Cooler															

Form #PM-IV-Turbine Drive-(2)

PREVENTIVE MAINTENANCE PROGRAM
Boiler Auxiliary Equipment
TURBINE DRIVE

Date

Item#___TURBINE DRIVE___needs the following attention:

Item#___TURBINE DRIVE___needs the following attention:

Item#___TURBINE DRIVE___needs the following attention:

Item#___TURBINE DRIVE___needs the following attention:

Item#___TURBINE DRIVE___needs the following attention:

Estimated Cost to do the Work:
Item___TURBINE DRIVE___Budget or Fund Account No. __________ $__________
Item___TURBINE DRIVE___Budget or Fund Account No. __________ $__________
Item___TURBINE DRIVE___Budget or Fund Account No. __________ $__________
Item___TURBINE DRIVE___Budget or Fund Account No. __________ $__________
Item___TURBINE DRIVE___Budget or Fund Account No. __________ $__________

Total Estimated Cost $__________

Actual Cost:
Item___TURBINE DRIVE___ $__________
Item___TURBINE DRIVE___ $__________
Item___TURBINE DRIVE___ $__________
Item___TURBINE DRIVE___ $__________
Item___TURBINE DRIVE___ $__________

Total Cost $__________

Exhibit S

PREVENTIVE MAINTENANCE PROGRAM
PHASE IV

Boiler Auxiliary Equipment
FAN

Boiler No. Date

Check column if the maintenance is satisfactory. If repairs are needed put (r) in column and explain on the back of this sheet.	Vibration	Bearing Temp.	Dirt Accumu.	Dust Seals	Shaft	Couplings																	

Form #PM-IV-Fan-(2)

PREVENTIVE MAINTENANCE PROGRAM
Boiler Auxiliary Equipment
FAN
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Item#___FAN___needs the following attention:

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Item#___FAN___needs the following attention:

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Item#___FAN___needs the following attention:

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Item#___FAN___needs the following attention:

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Item#___FAN___needs the following attention:

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Estimated Cost to do the Work:

Item___FAN___Budget or Fund Account No. ______________ $________________
Item___FAN___Budget or Fund Account No. ______________ $________________
Item___FAN___Budget or Fund Account No. ______________ $________________
Item___FAN___Budget or Fund Account No. ______________ $________________
Item___FAN___Budget or Fund Account No. ______________ $________________

Total Estimated Cost $ ________________

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Actual Cost

Date Completed ________________

Item___FAN___ $________________
Item___FAN___ $________________
Item___FAN___ $________________
Item___FAN___ $________________
Item___FAN___ $________________

Total Cost $________________

PLANNED PREVENTIVE MAINTENANCE SOPHISTICATED PROGRAM

The Sophisticated Planned Preventive Maintenance Program uses the same basic procedures and forms which are employed in the standard system. Machine processing through computers provides the necessary information to operate, control, evaluate and plan the program.

This systems approach provides a workable and practical information program to meet the operating needs and demands for physical plant administrators.

It is recognized that the program is applicable to those colleges and universities which are large enough to have a computer on campus or available to them. Campus computer laboratories or computer centers can adapt a Preventive Maintenance Program to the existing programs as they compliment established financial, facilities and inventory information systems.

In a computer operation, the physical facilities of a college or university usually are set up to cover land and buildings, rooms and facilities, equipment and maintenance control data. These can be used as basic data for the setting up of a Sophisticated Planned Preventive Maintenance Program to assist physical plant administrators in the areas of budget and finance, personnel, inventory, purchasing, facilities analysis, long range projection, and academic program coordination.

The use of a computer offers management at all levels unusual speed in collecting, assimilating, and reporting to facilitate the decision making process.

Setting up a Sophisticated System

The management and staff of a computer laboratory or center can and should assist all physical plant administrators in setting up the program. Since there are many systems of coding and information data collection this handbook will not cover the entire field of data processing.

If a copy of this handbook is given to the head of the computer laboratory, he will be able to advise the physical plant administrator as to the recommended procedures for putting the Planned Preventive Maintenance Program on the computer.

Some of the questions raised will be:

1. What are the goals and objectives of the program
2. What are the specific needs for information
3. Is there data available to establish the program such as:
    a. operational data
    b. historical data
    c. control data
4. What analysis of the computer data is to be made

In conclusion, a Planned Preventive Maintenance Program offers a college or university many benefits. Foremost, it provides a systematic program of maintenance which offers improved maintenance and repair, resulting in a lower cost of operation, a better understanding of costs, defined policies and procedures and higher morale among all persons interested in or associated with maintenance.

Any school or university, regardless of the size of its maintenance staff, can put a Planned Preventive Maintenance Program into effect.